THE VARIABILITY OF EUCALYPTUS UNDER CULTIVATION.

Part I.

By J. H. Maiden.

In spite of the profusion of recent literature concerning the limitations of species in the genus Eucalyptus, an important aspect of the subject has been but little touched upon. I allude to the changes which the species undergo under cultivation. That variation does take place in cultivated species in Australia is well known; but it is in other parts of the world—in France and Algeria, in California and South Africa—that the changes have been most marked and noted. In fact it will be a surprise to many people how extensive is the list of new species of Eucalyptus described (chiefly in France) from plants raised from Australian seed.

This paper is of a preliminary character, mainly dealing with the extra-Australian species referred to. When in Paris a few years ago I was, through the kindness of MM. Edmond Bureau and Henri Hua, given an opportunity of studying the Eucalyptus herbarium in the Muséum d'Histoire Naturelle. Since my return to Australia these gentlemen have added to their kindness by sending to me nearly a thousand sheets of this genus, including a nearly complete set of the species of M. Naudin; I am thus enabled to speak with a confidence that I could not otherwise assume.

To M. Trabut, who has done excellent work with Eucalypts in Algeria, I am indebted for copies of his works and specimens of Eucalyptus hybrids.

To the Director of the U.S. National Herbarium, Washington, to Professor A. J. McClatchie, of Phœnix, Arizona, Mr. J. Burtt

Davy of Berkeley, and Mr. Abbot Kinney, of Los Angeles, California, I am indebted for specimens and literature concerning American grown Eucalypts; and to Mr. E. Hutchins, Conservator of Forests, Capetown, and others, I am indebted for South African specimens. To Dr. Prain, Superintendent of the Royal Botanic Garden, Calcutta, and Mr. I. H. Burkill, of the Calcutta Museum, I am indebted for much Indian grown material. Space will not permit detailed reference to the many other friends from whom I have received specimens of cultivated Eucalypts.

The botanist who, above all others, has given most attention to cultivated Eucalypts is the late M. Charles Naudin, Director of the Experimental Station at the Villa Thuret, Antibes, Southern France (Alpes Maritimes). He has published two masterly works on the subject* which for the sake of brevity I will henceforth refer to as 1st Mem., and 2nd Mem., respectively. Both works are rare, the latter excessively so. I have had the advantage of studying his specimens and of admiring the judicious remarks attached by him, not only to cultivated specimens but to the spontaneous Eucalyptus specimens in the Paris Museum.

M. Naudin desires to adopt the conservative attitude in protesting against the multiplication of species. Speaking of over 300 species being described at the date of 1st Mem., he adds, p. 338 :—

"Il est réellement beaucoup moindre, et l'exagération ici s'explique aisément par l'extrême variabilité des formes spécifiques; par les changements d'aspect, je dirais presque les métamorphoses que les individus eux-mêmes subissent en passant de l'état juvénile à l'état adulte; par la défectuosité des matériaux d'herbier, et aussi par la tendance ordinairement inconsciente de

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* (1) "Mémoire sur les Eucalyptus introduits dans la région Méditerranéenne." Annales des Sciences Naturelles. 6e. Série. Bot. T. xvi. pp. 337-430 (1883).

(2) "Déscription et emploi des Eucalyptus introduits en Europe, principalement en France et en Algérie." Second Mémoire. Antibes, 1891, pp. 1-72.

beaucoup de descripteurs à considérer comme espèces légitimes des formes qui, pour d'autres, sont de simples variétés."

At the same time the following passage (p. 410) shows that he was inclined to split up species which Australian botanists with ampler material do not :—

"L' *E. Lehmanni* est certainement une des espèces les plus distinctes de tout le genre, et il serait difficile de le confondre avec aucun autre." He then goes into the question of the fusion of calyces which caused Schauer to form his genus *Symphyomyrtus*.

While it is evident from the notes I will give under each species that I am of opinion that most of M. Naudin's species cannot stand, yet I must point out that these Naudinian and other species-names must be respected in nomenclature, *e.g.*, *E. amplifolia* (unless superseded by a name of Robert Brown's) is a name that must be adopted if Naudin's contention that this particular form of *E. tereticornis* is worthy of specific rank is held to be valid.

Naudin had not completed his work of naming, for he ends his 2nd Memoir with the words, "Plusieurs autres espèces d'Eucalyptus existent dans nos jardins de Provence, mais leur étude n'est pas assez avancée pour me permettre d'en parler dans ce Mémoire."

It would add much to the value and interest of this paper if it could be illustrated, but as this is impossible, I will elsewhere publish figures of all species described from cultivated forms, later on. It will then be more fully understood that a study of cultivated forms is absolutely necessary for a proper realisation of the affinities of the species. Affinities between species are brought out by study of a long series of cultivated forms that might not be suspected if spontaneous specimens were alone examined.

It must be borne in mind that the naming of Eucalypts from cultivated specimens is not an invention of the moderns; the old botanists freely indulged in it, and their nomenclature, often an

excrescence on botanical literature, as it has turned out, must be studied and taken for what it is worth.

I propose to arrange my paper in the following order:—

1. Species-names given to cultivated specimens by old authors.

2. Species-names given by Naudin and others to French and Algerian specimens.

3. Species-names given to American specimens.

4. Names given to cultivated reputed Eucalyptus hybrids.

1. Species-names given to cultivated specimens by old authors.

1. *E. ambigua*, Dehnhardt (Cat. Pl. Hort. Camald. Ed. ii. 20) is *E. amygdalina*, Labill. var. *radiata*, Deane & Maiden.

2. *E. androsmæfolia*, Hoffmg. (Verz. Pfl. Nachtr. ii. 113) is *E. ovata*, DC. (Prod. iii. 218).

3. *E. calyculata*, Herb. Link. in Herb. Berol., is *E. amygdalina* var. *radiata*.

4. *E. camaldulensis*, Dehnh. (op. cit.) is *E. rostrata*, Schlecht.

5. *E. connata*, Dum-Cours, (Bot. Cult. Ed. ii., vii. 280) is *E. diversifolia*, Bonpl., DC. Prod. iii. 220.

6. *E. cordata*, Lodd. (Bot. Cab. t. 283) is *E. pulverulenta*, Sims.

7. *E. Cunninghamii*, Sweet, (Hort. Brit. Ed. ii. 209) is *E. stricta*, Sieb

8. *E. discolor*, Desf. (Tabl. Ed. ii. 198 nomen. Cat. Hort. Par. Ed. iii. 408) is *E. pilularis*, Sm.

9. *E. diversifolia*, Link, (Hort. Monac.) is *E. stricta*, Sieb. (probably).

10. *E. diversifolia*, Otto, is *E. amygdalina*, Labill. var. *radiata*, Deane & Maiden.

11. *E. elata*, Dehnh. (op. cit. 26) is *E. viminalis* according to Bentham; or *E. amygdalina* according to von Mueller; or *E. goniocalyx*, F.v.M., according to some sucker-foliage which I believe to be authentic.

12. *E. elata*, Giordano, is *E. amygdalina* var. *radiata*.

13. *E. elongata*, Link, (Enum. Hort. Berol. ii. 30; DC. Prod. iii. 222), "very doubtful" (Bentham) is probably *E. eximia*, Schauer.

14. *E. flexilis*, Regel, (Gartenfl. 1858, 284). I have been unable to see specimens.

15. *E. gigantea*, Dehnh. (op. cit. p. 20) is *E. globulus*, Labill.

16. *E. glandulosa*, Desf. (Cat. Hort. Par. Ed. iii. 408) is *E. amygdalina*, Labill.

17. *E. glaucophylla*, Hoffmgg. (Verz. Pfl. Nachtr. ii. 113).

18. *E. globularis*, Hort. (ex DC. Prod. iii. 219) is *E. amygdalina*, Labill.

19. *E. hypericifolia*, Dum-Cours. (Bot. Cult. Ed. ii. vii. 279).

20. *E. hypericifolia*, Link, (Bot. Cult. Ed. ii. vii. 279) is *E. cneorifolia*, DC. (? same as 19).

21. *E. Lindleyana*, DC. (Prod. iii. 219) is *E. amygdalina*, Labill.

22. *E. linearis*, Dehnh. (op. cit. p. 20), is probably a valid species.

23. *E. longifolia*, Lindl. (Bot. Reg. t. 947; Spreng. Cur. Post. 195) is *E. amygdalina*, Labill.

24. *E. media*, Link, "Jardin de Berlin, M. Otto, 1826" (DC. Prod. iii. 222).

25. *E. mucronata*, Link, (Enum. Hort. Berol. ii. 30) is *E. ovata*, DC. (Prod. iii. 218).

26. *E. myrtifolia*, Link, "Jardin de Berlin, M. Otto, 1826" (DC. Prod. iii. 222).

27. *E. oppositifolia*, Desf. (Tabl. Ed. i. 222) is *E. corymbosa*, Sm., according to a specimen, in leaf only, in Herb. Mus. Paris from the Jardin Noisette, 1812, presented by M. Bonpland in 1833.

A second specimen in the same herbarium, presented by M. Bonpland in 1833 and labelled in very old hand-writing "*opositifolius*" (sic) is indeterminable.

28. *E. oppositifolia*, Noisette. A specimen from Herb. Paris, is *E. tereticornis*, Sm.

29. *E. penicillata*, Hort. (DC. Prod. iii. 218) is *E. piperita*, Sm., or *E. eugenioides*, Sieb. (probably).

30. *E. perfoliata*, Noisette, is *E. pulvigera*, A. Cunn. (*E. cordata*, Labill.).

31. *E. perfoliata*, Desf. (Cat. Hort. Par. Ed. iii. 408) "very doubtful" (Bentham) is probably *E. globulus*, Labill.

32. *E. persicifolia*, Lodd. (Bot. Cab. t. 501) is *E. Gunnii*, Hook. var. *acervula*, Deane and Maiden (probably).

33. *E. populifolia*, Desf. (Cat. Hort. Par. Ed. iii. 408).

34. *E. procera*, Dehnh. (op. cit. p. 20) is *E. obliqua*, L' Hérit.

35. *E. pulchella*, Desf. (Cat. Hort. Par. Ed. iii. 408) is *E. linearis*, Dehnh.

36. *E. pulverulenta*, Link, (Enum. Hort. Berol. ii. 31 and Hort. Monac.) is *E. globulus*, Labill. (probably).

37. *E. purpurascens*, Link, (Enum. Hort. Berol. ii. 31) is *E. amygdalina*, Labill. I have also seen a splendid photo. of De Candolle's specimen. It is in leaf only, leaves strictly opposite. Evidently in the seedling stage. It is labelled "Jard. de Berlin, M. Otto, 1826," and "*E. purpurascens*, Link, *β. petiolulata*, DC." See DC. Prod. iii. 221.

38. *E. reticulata*, Link, (Enum. Hort. Berol. ii. 29; DC. Prod. iii. 222), "very doubtful" (Bentham). It was obtained from M. Otto, Jardin de Berlin, 1826. I have a remarkably good photograph of the specimen (in leaf only) examined by De Candolle for the Prodromus (iii. 222). It is very near *E. pallens*, DC., if not identical with it.

39. *E. rigida*, Hoffmgg. (Verz. Pfl. Nachtr. ii. 114; DC. Prod. iii. 221) is *E. obtusiflora*, DC.

40. *E. rubricaulis*, Desf. (Cat. Hort. Par. Ed. iii. 408). See *E. linearis*, Dehnh.

41. *E. stenophylla*, Link, (Jardin de Berlin, M. Otto, 1826; DC. Prod. iii. 222).

42. *E. tuberculata*, Parm. (DC. Prod. iii. 221), "very doubtful' (Bentham), "Jardin de Berlin, M. Otto, 1826." It is a narrow lanceolate specimen in the seedling stage; leaves strictly opposite. It is probably *E. amygdalina*, Labill., or *E. viminalis*, Labill.

2. Species-names given by Naudin and others to French and Algerian Specimens.

1. *E. amplifolia*, Naudin, 2nd Mem. p. 28.

Naudin says (loc. cit.), "il appartient à ce groupe embrouillé d'espèces et de variétés dont l'*E. tereticornis* peut être considéré comme le centre, mais il a en même temps des charactères si particuliers qu'on ne peut faire autrement que d'y voir une bonne espèce."

A specimen in fruit in Herb. Mus. Paris bears the following label in M. Naudin's handwriting:—

"*Eucalyptus amplifolia*, Ndn. Du bois de Boulogne d'Alger, administration forestière. Ch. Ndn."

A second specimen in young foliage bears the label:—

"*Eucalyptus amplifolia*, Naud. Cultivé à Cannes, M. Naudin."

A third specimen, evidently belonging to the second, bears the following label in M. Naudin's handwriting, together with a sketch:—

"*Eucalyptus amplifolia*, Ndn. Jardin du Riou, à Cannes, 14 Septembre, 1880, Ch. Ndn. Ombelles de 7 à 9 fleurs et quelquefois plus attenuées en un court pédicelle-pedoncle commun plus court que le pétiole. Arbrisseau, feuilles coriacés, très grandes. Opercule des boutons, conique ou cornu, plus long que le tube du calyce. Non *E. platyphylla*, Benth."

These specimens are identical with those of *E. tereticornis*, Sm. var. *latifolia*, Benth. (B.Fl. iii. 242; Deane and Maiden, Proc. Linn. Soc. N.S. Wales, 1899, p. 469; Maiden, Bull. Herb. Boissier, 1902, p. 571). Individual specimens are referred to in the last paper in the following words (p. 576):—"*f.* Goulburn to Bowral (J.H.M.). The 'Swamp Gum' form with long, narrow, horned opercula, broad leaves and small fruit. Received under the name 'Broad-leaf Blue Gum' from Marulan."

See also "*k*."

See also "*y*" (p. 577). "New England, Glen Innes, Tenter field, with broad sucker leaves and quadrangular stems, broad

mature leaves and small fruits; also Tenterfield to Sandy Flat, very broad leaves and some with glaucous buds."

M. Naudin's specimens do not appear to have undergone any alteration in cultivation.

In the Catalogue of Vilmorin, Andrieux et Cie., Paris, it is described as "Grand arbre, remarquable par la rapidité de sa croissance. Acclimaté dans le Midi de la France et l'Algérie."

2. *E. Andreana*, Naudin, Rev. Hort. 1890, p. 346; 2nd Mem. p. 52. See also Kew Bulletin (Additional Series, 1900).

Named in honour of M. Edouard André, au Golfe Juan, who introduced it into France.

Copy of labels in M. Naudin's handwriting in Herb. Mus. Paris (Reçu en Mars 1890):—

"*Eucalyptus Andreana*, Ndn., Jardin de M. de Vilmorin, au Golfe Juan, Ch. Ndn."

It is *E. amygdalina*, Labill. var. *radiata*, Deane and Maiden (*E. radiata*, Sieb., non *E. radiata* in Hook. Fl. Tas.).

I have received similar specimens from MM. Vilmorin, Andrieux et Cie., of Paris, who describe it as "Arbre très elegant et très ornemental. Se couvre de fleurs blanches, du plus bel effet."

3. *E. angulosa*, Naudin (I cannot trace where this species was described).

Two specimens in Herb. Mus. Paris are labelled as follows in M. Naudin's handwriting:—

(1) In unripe fruit only. "*Eucalyptus angulosa*, Ndn. var du *tereticornis*? Villa Thuret, 12 Août 1887. Ch. Ndn."

(2) In leaf only. "*Eucalyptus angulosa*, Ndn., pourrait n'être qu'une variété à larges feuilles du *tereticornis*. Villa Thuret, à Antibes. Ch. Ndn."

The fruits are rather larger, and the pedicels shorter, than in *E. amplifolia*, Ndn., but it is undoubtedly, as Naudin suggests, a form of *tereticornis*, which is, as I have pointed out (Bull. Herb. Boiss. 1902), a very variable species.

In the Catalogue of MM. Vilmorin, Andrieux & Cie., it is stated, "Propre aux terrains secs arides."

4. *E. argentea*, (?) Cordier. Copy of label in Herb. Mus. Paris: "*Eucalyptus argentea.* Cultivé par Mons. Cordier, Maison Carrée près Alger, 1 Avril, 1876, Durandoz" (?).

M. Naudin has written on this label, "Je ne trouve aucun *E. argentea* décrit dans les auteurs." It is *E. melliodora*, A. Cunn.

5. *E. citryandra*, (?) Vilmorin, is *E. coccifera*, Hook.f. I have referred to this plant in Report Aust. Assoc. Adv. Science, Hobart Meeting, 1902, Vol. ix., p. 365.

6. *E. cœrulescens*, Naudin, 2nd Mem. p. 47. A label in Herb. Mus. Paris reads:—*Eucalyptus cœrulescens*, Naudin, du Bois du Boulogne d'Alger, Février 1883. Type. Ech. fructifère venant de la Villa Thuret (Alpes Mar.)." In flower and fruit.

A second label reads "*Eucalyptus cœrulescens* Ndn. Villa Thuret, Nov. 1889. Ch. Ndn." In bud only. They are referable to *E. melliodora*, A. Cunn.

I have received similar specimens from MM. Vilmorin, Andrieux & Cie. M. Naudin (2nd Mem.) recognised the affinity of this plant to *E. melliodora*, but he distinguishes *E. cœrulescens* by the shorter leaves, "and perhaps better by its general glaucescence." I may point out that *E. melliodora* is often glaucous.

7. *E. cultrifolia*, Naudin, 2nd Mem., p. 64. (I have seen this species referred to as *cultriformis*, Naudin). Copy of a label in Herb. Mus. Paris in Naudin's handwriting:—"*Eucalyptus cultrifolia*, Ndn. Jardin Nabonnand au Golfe Juan, Ch. Ndn." This is *E. eugenioides*, Sieb., a little altered under cultivation.

Another specimen in the same herbarium bearing the label "Eucalyptus not described which flowered in my garden last year, very few plants of it in this country, none of them flowered but with me" (in Lambert's handwriting), and the further label "Herb. Mus. Paris. Herbier donné par Mr. Bonpland en 1833. Cult. e horto Lamberto," to which is added, by M. Naudin, "parâit être l'*E. cultrifolia*, Ndn," is also *E. eugenioides*, Sieb.

"Espèce nouvelle, du moins très probablement" (Naudin).

It seems to me, from examination of a large number of cultivated specimens which I have referred to *E. eugenioides*, Sieb.,

and some of them nearly a century old, that this species is rather liable to alteration under cultivation.

8. *E. desertorum*, Naudin, 2nd Mem. p. 56.

Copy of a label in Herb. Mus. Paris, "*Eucalyptus desertorum*, Naudin (fragments de l'exemplaire typique). Originaire des déserts de l'Australie intérieure. Cult. à la Villa Thuret, Antibes (Alpes Maritimes). M. Naudin, 1889." It is *E. uncinata*, Turcz. A shrub, flowering abundantly the third year from seed.

9. *E. firma* (? auct. et ? cult.).

I have seen a specimen in Herb. Paris labelled *E. firma* which is referable to *E. diversifolia*, Bonpl.

10. *E. Foeld Bay*, ? Naudin.

"Belle espèce à rameaux retombants." (Cat. of Vilmorin, Andrieux & Cie.).

It is *rostrata*, Schlecht, or *tereticornis*, Sm., according to specimens from the above firm. I have seen only leaves and fruits. Buds are desirable, and also information as to where it was described.

11. *E. globulosus*, St. Lag., Ann. Soc. Bot. Lyon, vii. (1880), 125.

I have not seen specimens.

12. *E. glomerata*, Naudin. I do not know where it was described. I have seen only a head of fruits from which it appears, hardly with doubt, to be identical with *E. concolor*, Schauer.

13. *E. gracilipes*, Naudin, 2nd Mem. p. 37.

Naudin gives a general account of this supposed new species, which he says is "très analogue à l'*E. leucoxylon*." I have not seen a full suite of specimens, only fruits from MM. Vilmorin, Andrieux & Cie., and am not convinced that it is specifically distinct from *E. leucoxylon*, which is a somewhat variable species.

The Cat. of MM. Vilmorin, Andrieux & Cie., says:—"Espèce très voisine de l'*E. leucoxylon*. Elle en diffère surtout à l'état juvénile et à l'état adulte par son feuillage beaucoup plus clair."

14. *E. Huberiana*, Naudin, 2nd Mem. p. 42.

Described from one tree obtained at Nice, where it was cultivated by M. Huber, after whom it is named. This is another form, which, like *E. Mazeliana*, is allied to or identical with *E. viminalis*. It also has umbels with seven pedicellate flowers. Operculum conical, fruit truncate pyriform, and three-celled. I have not seen specimens. The part of Australia whence the seed was obtained is unknown.

15. *E. insignis*, Naudin, 2nd Mem. p. 30.

Naudin has described this supposed new species in a general way, but has not given a strict botanical definition. It is near *E. tereticornis*, but, in M. Naudin's opinion, distinct from it. I have not seen a specimen.

16. *E. jugalis*, Naudin, 2nd Mem. p. 37.

I have not seen specimens of this plant. "Quelques horticulteurs lui donnent le nom de *fissilis*. . . . Pour ne rien préjuger, je l'ai nomme *jugalis*, qui rappelle la disposition par paires des feuilles du premier âge" (Naudin, *loc. cit.*).

17. *E. Lamberti*, (? auct.).

This is *E. saligna*, Sm., according to specimens I have received through the courtesy of MM. Vilmorin, Andrieux & Cie.

18. *E. Mazeliana*, Naudin, 2nd Mem. p. 41.

Named in honour of M. Mazel, a cultivator of Eucalyptus in his garden at "Golfe Juan."

M. Naudin gives a general description of the plant. It has stood frosts of 12-13° C. "à Mont Sauve, dans le Gard," where it has been cultivated by M. Mazel.

It is described by M. Naudin as closest to *E. viminalis*. It is stated to have, in the young state, leaves narrower and longer than the generality of those of *E. viminalis*. The inflorescence and fruit, however, distinguish *E. Mazeliana* from *E. viminalis*. The umbels, axillary and pedunculate, are seven-flowered. I have not seen specimens. *E. Mazeliana* would appear to be near to (if not identical with) *E. viminalis*, Labill. var. *pedicellaris*, F.v.M (*E. Smithii*, R. T. Baker).

19. *E. Müllerí*, Naudin, Rev. Hort. 1st Sept., 1885, p. 406; 2nd Mem. p. 45.

A specimen in fruit and bud in Herb. Mus. Paris, bears the following label :—

Eucalyptus Müllerí, Naudin (ombelles normalement à 7 fleurs) ex exemplariis typicis. Villa Thuret (cultivé). Novembre 1889. M. Naudin."

A second specimen in bud and flower bears the following label :—"Env. par M. Ramel 1872. Cult. à Alger," to which M. Naudin has added "*Eucalyptus Müllerí*, ? Ndn." The specimen is more robust than the previous one, and they are both referable to *E. Gunnii*, Hook. f. var. *acervula*, Deane & Maiden.

Naudin (*loc. cit*) quotes this as an instance where it is not easy to indicate a species of Eucalyptus by a simple description. He says that at first *E. Müllerí* may be confused with *E. viminalis*, *goniocalyx*, and, above all, *Gunnii*. The normal number of flowers in the umbel is seven. It and *E. globulus* are the most rapid growers of all Eucalypts in France.

The Catalogue of Vilmorin, Andrieux & Cie., says :—"Remarquable par sa croissance rapide et sa rusticité relative. Il réussit bien dans les terrains rocheux et pierreux, même peu profonds. Haut 50m."

Even if my determination is incorrect, the name *Müllerí* cannot stand, as we already have *E. Muelleri*, Miq. (*incrassata*) 1856; *Muelleri*, T. B. Moore, 1886; *E. Müllerí*, Deane, Rec. Geol. Surv. Vict. Vol. i. 24 (1902); to say nothing of *E. Muelleriana*, Howitt (1890), and perhaps others.

20. *E. myrtiformis*, Naudin, 2nd Mem. p. 50.

Copy of a label in Herb. Mus. Paris :—"*Eucalyptus myrtiformis*, Naudin, Villa Thuret, Alpes Maritimes. Cult. M. Naudin. Reçu en Mars 1890."

This is probably *E. cneorifolia*, DC., but the anthers are not ripe. Are flowers and fruits available for examination ?

M. Naudin knows only one plant, a shrub growing at the Villa Thuret. He points out that the buds remain two years before opening—a not uncommon thing with Eucalypts in Australia.

21. *E. pendulosa* (? auct.).

Maison Carrée près Alger, Villa Cordier 1877, 1er. Avril, Durandoy (?).

A specimen in Herb. Mus. Paris is *E. viminalis*, Labill.

Naudin (1st Mem. p. 385) says:—"Il existe dans quelques jardins, sons le nom d'*E. pendula*, une variété du *viminalis* que ne me paraît différer par rien d'essentiel du type de l'espèce."

This must not be confused with the synonym of *E. bicolor*, A. Cunn. It may be identical with the *E. pendulosa* just referred to.

22. *E. pseudo-globulus*, (? auct.).

"Nous ne lui connaissons jusqu'ici qu'une seule variété, celle qui a reçu le nom de *pseudo-globulus*, qui ne se distingue du *globulus* ordinaire que par le volume de ses fruits, de trois ou quatre fois plus petits que ceux du type commun. Il y a d'ailleurs tous les passages entre les extrêmes de volume" (Naudin, 2nd Mem. p. 34). I know nothing more of this form.

23. *E. quadrialata* (? auct.).

"De collection, peu répandu" (Cat. of Vilmorin, Andrieux & Cie.). I have not seen the reputed species.

24. *E. rebrum* (?Cordier). Copy of labels in Herb. Mus. Paris:

(1) "*Eucalyptus rebrum*, Italia, Mai, 171, A. Cordier."

(2) "Doit être l'*E. crebra*. L'*E. rebrum* n'existe pas. 8e 74. Ramel."

(3) (In M. Naudin's handwriting) "Eucalyptus, n'est pas l'*E. crebra*." It is *E. Gunnii*, Hook. f. var. *acervula*, Deane and Maiden.

25. *E. scyphoidea*, Naudin. I do not know where it was described.

Copy of a label in Herb. Mus. Paris in M. Naudin's handwriting:—"*Eucalyptus scyphoidea*, Ndn. Species nova. Trouvé dans le jardin Nabonnand au Golfe Juan. Arbre unique dans le pays. Villa Thuret, 1889. Ch. Ndn."

This is *E. macrorrhyncha*, F.v.M. var. *brachycorys*, Benth.

26. *E. viminalis*, Labill. var. *fertilis* (? auct.).

"Splendide variété, relativement rustique, croissant vigoureusement" (Cat. of Vilmorin, Andrieux & Cie.).

I have not seen any specimens.

27. *E. vitellina*, Naudin, 2nd Mem. p. 65.

Copy of label in Herb. Mus. Paris in M. Naudin's handwriting: "*Eucalyptus vitellina*, Ndn., Jardin Narbonnand au Golfe Juan, 14 Janvier 1890. Ch. Ndn."

It is *E. amygdalina*, Labill. This was named from a young tree 8-9 mètres in height, and the only one known.

M. Naudin has pointed out the affinity of his species with *E. pauciflora* and *E. amygdalina*, and considers that it is intermediate between them.

I have some additional specimens of Eucalypts grown in French gardens which are labelled with recognised botanical names and which do not belong to the species indicated. By reason of paucity of material I am unable to speak more definitely.

3. Species-names given to American Specimens.

1. *E. californica*, Kinney, "Eucalyptus,"* p. 191. On p. 177 he says, "What I have called *Eucalyptus californica* is by von Mueller called *occidentalis*." See *occidentalis* var. *californica*. There is a photographic figure of a twig of *E. californica* in Mr. Kinney's work.

2. *E. McClatchie*, Kinney, op. cit. 188. Species described from specimens in bud and flower, the only allusion to the fruit being "valves enclosed." "Bark sheds in long strips. The general appearance of the tree suggests *Eucalyptus globulus* or *goniocalyx*." I have not seen specimens.

3. *E. Mortoniana*, Kinney, op. cit. pp. 193 and 294 (with photograph of a twig). Specimens lent to me by the Secretary of the Smithsonian Institution (from the U.S. National Museum) appear to be referable to *E. Maideni*, F.v.M.

4. *E. occidentalis*, Endl. var. *californica*, Kinney, op. cit. p. 92. "*Eucalyptus obcordata* has the calyx sessile to the stalk, while

* "Eucalyptus." By Abbott Kinney. Los Angeles, Cal., U.S.A.

our *Eucalyptus occidentalis*, which for convenience I shall name var. *californica*, varies from it in having long stalklets." The var. *californica* is still further described in several sentences. Vide *E. californica*, *supra*.

5. *E. pinnata* (?auct.). "The small grey-leaved *Eucalyptus pinnata* has grown well" (Kinney, op. cit. 117). I have never seen *E. pinnata* further referred to in print. Specimens of *E. pinnata* received from Mr. J. Burtt Davy, then of Berkeley, Cal., I referred to the Tasmanian *E. coccifera*, Hook.

4. Names given to cultivated reputed Eucalyptus Hybrids.

Dr. Trabut, of Algiers, has during the last few years named some Eucalypts which he frankly terms hybrids. Following is a list of those of which I have records. I may mention that it may cause inconvenience if hybrids be named just as species are, without any indication attached to the name that they are hybrids. In the case of M. Naudin's supposed species, the case is different, as he does not admit that they are hybrids; yet I think that the variation of some of them, at least, is caused by hybridism.

The question of hybridism in Eucalyptus is an important one, and considerations of space preclude discussion of it on the present occasion. I am of opinion that hybridism does play a part in the variation of species in the genus, and will take an early opportunity in another publication of expressing some of my views on the subject.

1. *E. Bourlieri*, Trabut, Rev. Hort. 1903, p 327; preliminary note in Rev. Hort. de l'Algérie, Aug , 1901, p. 239. Dr. Trabut in naming this plant after Dr. Bourlier, says (Rev. Hort. Alg.) " Enfin un hybride de *globulus* que je me propose de décrire et de dédier à l'arboriculteur distingué chez lequel il a pris naissance."

" Cet *Eucalyptus Bourlieri* est un bel arbre qui mérite une étude attentive. Dans bien des cas il n'est pas possible de déterminer

exactement l'espèce qui a fourni le pollen, on est réduit à des conjectures.

"De ces observations poursuivies depuis une douzaine d'années, il résulte que certaines espèces du genre *Eucalyptus* cultivées dans la région méditerranéenne peuvent se croiser spontanément et donner naissance à des *types nouveaux*. Certaines de ces formes ont une descendance qui présente une fécondité et une fixité remarquables.

"Ces hybrides sont intéressants, car ils se montrent très robustes, très feuillus, il est probable que certains seront preférés aux espèces typiques introduites du pays d'origine."

E. Bourlieri is figured in Rev. Hort. The fruits (for samples of which I am indebted to Dr. Trabut) present a remarkable resemblance to those of *E. cordata*, Labill, but the leaves are quite different.

Dr. Trabut says (Rev. Hort. 1903), "L'*Eucalyptus Bourlieri* est evidemment un hybride de *globulus*, mais il ne parâit pas possible de déterminer le parent mâle; M. Bourlier inclinait pour le *robusta*, mais rien ne permet d'affirmer cette parenté."

2. *E. cornuta* × *Lehmanni*, Bourlier, in Trabut, Rev. Hort. de l'Algérie, Aug. 1901, p. 239.

A preliminary note.

3. *E. gomphocornuta*, Trabut, Rev. Hort. 1903, p. 326, with fig.

E. gompho × *cornuta*, "ayant analogie avec l'*E. occidentalis*" (Bourlier in Trabut, Rev. Hort. de l'Algérie, Aug. 1901, p. 239).

It has been referred to for some years as follows in the Cat. of MM. Vilmorin, Andrieux & Cie.:—"*Eucalyptus gompho-cornuta*, intéressant hybride d'*E. gomphocephala* et d'*E. cornuta*."

From Dr. Trabut's figure it so strongly resembles *E. gomphocephala*, DC., that it seems a pity to give it specific rank.

4 & 5. *E. gompho-occidentalis* and *E. Gunnii-globulus*, both distributed by MM. Vilmorin, Andrieux & Cie., are near *E. gomphocephala*, DC., as far as fruits are concerned, but I have not seen complete specimens.

6. *E. Rameliana*, Trabut, Ass. Fr. av. Sc. 1891 (reference not seen); Bulletin Agric. de l'Algérie et de la Tunisie, 15th July, 1901,* p. 326; Rev. Hort. de l'Algérie, Aug. 1901, p. 237; also Rev. Hort. 1903, p. 325, with figures of fruits and descriptions in both cases.

This is stated by Dr. Trabut to be a hybrid between *E. botryoides*, Sm., and *E. rostrata*, Schlecht.

The name is, however, preoccupied, there being an *E. Rameliana*, F.v.M. (Fragm. x. 84.)

7. *Eucalyptus Trabuti*, Vilmorin, Catal. gr. arbr. (name only). This is, according to Trabut, synonymous with *E. Rameliana*, which it should replace.

* Before formally publishing it Dr. Trabut must have drawn attention to it some years previously, for in "The Eucalyptus in Algeria and Tunisia," by Edward Pepper, Proc. Amer. Philos. Soc. xxxv. (reprinted 29th May, 1896), I find, at p. 50, "*E. Rameliana* (hybrid from *E. rostrata* and *E. botryoides*, leafy and strong) obtained by Dr. Trabut."